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A NEW SPECIES OF NORTH AMERICAN TARANTULA, *APHONOPELMA PALOMA* (ARANEAE, MYGALOMORPHAE, THERAPHOSIDAE)

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ABSTRACT. *Aphonopelma paloma* new species, is distinguished from all other North American tarantulas by its unusually small size and presence of setae partially or completely dividing the scopula of tarsus IV in both sexes. Both sexes also are characterized by a general reduction of the scopula on metatarsus IV. Males are characterized by a swollen third femur.

In 1939 and 1940 R. V. Chamberlin and W. Ivie described almost all of the currently recognized North American theraphosid spiders. Despite the acknowledged significance of their work, it is difficult to apply Chamberlin's keys with much success even in dealing with specimens from type localities, primarily because their small sample sizes did not allow variational assessment. Eleven of these species descriptions were based on single males, five on single females, and three on two males each (Chamberlin & Ivie 1939; Chamberlin 1940). By increasing the sample size and working with both sexes, I describe here a new species of tarantula, *Aphonopelma paloma*, based on characters that have been selected after evaluating variation. Because of deficiencies in variational data the values of characters such as spination, meristic and morphometric ranges, and various ratios as taxonomic tools have not been assessed adequately. Therefore, specific ratios and morphometric comparisons as well as tables showing spination patterns and leg and palp segment lengths and ranges are provided. These data should be useful in future taxonomic studies. A brief account of the natural history of *A. paloma* is included.

METHODS

Measurements were made using an American Optical 570 stereoscope equipped with an eyepiece micrometer accurate to 0.1 mm. Leg and pedipalp measurements were made on the side appearing most normal (e.g., not in the process of regeneration). Trochanters and coxae measurements were performed from ventral aspect, other leg and pedipalp segments from dorsal aspect (Coyle 1971). Carapace length was taken with anterior and posterior edges in the same plane. All ink drawings except femora were aided by a camera lucida. Palpal bulb and seminal receptacles were cleared in 10% NaOH (for 12 hr. at 50 °C.) prior to illustration. Scanning electron micrographs were taken with a JEOL JSM C35. Abbreviations for eyes are standard for Araneae. For leg spination, abbreviations are as follows: a = apical, b = basal, d = dorsal, e = preapical, L = left, m = medial, p = prolateral direction, r = retrolateral direction, R = right, usu. = usually, v = ventral, var. = variable, 0.33, 0.50, etc. = approximate fraction of the total segment length a spine is from the proximal end. Color references are from the color charts in the Munsell Book of Color and refer to color of live specimens under natural light conditions.

Aphonopelma paloma, new species
Figs. 1–12

Types.—Holotype male, allotype female from Pinal County, Arizona, 3 mi. NE exit 151 off I-8, 17–18 November 1989. Paratype males: 15 November 1986 – 1, 18–19 November 1989 – 2, 17 November 1990 – 2; Paratype females: 18 Nov. 1989 – 2. Holotype and allotype deposited in the American Museum of Natural History.

Etymology.—The specific epithet is from the Spanish word paloma (dove) which was used in the plural to describe a vast plain in the southwestern desert of Arizona - Palomas Plain - where there is an abundance of these tiny tarantulas.

Diagnosis.—***A. paloma*** differs from other North American theraphosid spiders by the presence of setae partially or completely dividing tarsus IV scopula and, to a lesser extent, tarsus III scopula (Figs. 1–3). Additional characters that further dif-

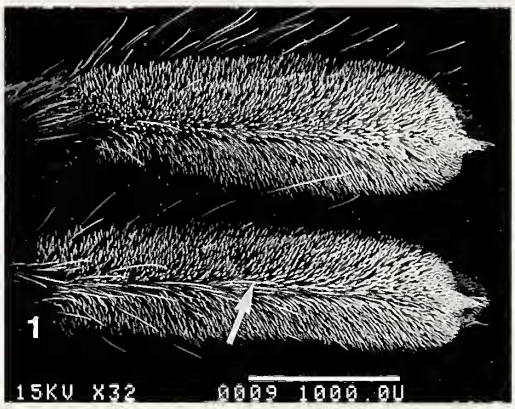
ferentiate *A. paloma* from other small species are its unusually small size, reduced metatarsal scopulation, and swollen third femora of males. Of the four small species that may overlap *A. paloma* in size (*Chaunopelma radinum* Chamberlin 1940; *A. marxi* Simon 1891 (Bonnet 1939); *A. phasmus* Chamberlin 1940; and *A. ingrami* Jung 1975 (Jung 1975; invalid name from unpublished thesis, types deposited under that name in the American Museum of Natural History)), only *A. ingrami* (name used for reference only) males have been found to do so but lack swollen third femora. Males from the remaining three species also lack swollen femora. All genera = *Rhechostica* Simon 1892 (Raven 1985) = *Aphonopelma* Pocock 1901 (Bull. Zool. Nomen. 48 (2) June 1991, Opinion 1637).

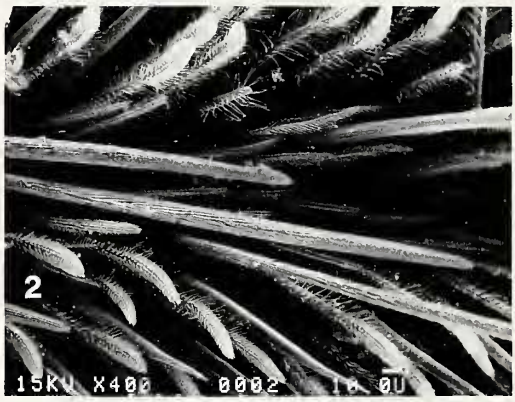
Description.—Male: Holotype male. Length 14.5 mm. Carapace length 5.7 mm, carapace width 5.1 mm carapace width/carapace length 0.89. Tibia I/metatarsus I, 1.09. Leg span 47 mm. Entire tarantula black except silvery reflection from black carapace hairs, grayish silver chelicerae, and interspersed long straw-colored abdominal setae. Ventral aspect also black except orange color of labium and anterior most portions of maxillae. Leg and palp segment lengths are in Table I. Third femur noticeably swollen (Figs. 4–6), width, viewed from above, 1.7 mm, femora I and IV at widest point 1.1 mm. Lower process of tibial spur with one megaspine, long upper process with two shorter megaspines (Fig. 7).

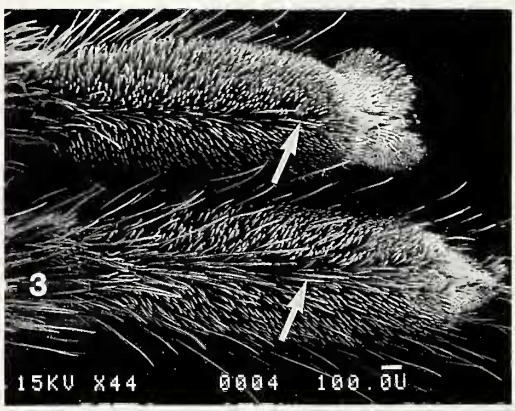
Chelicerae clothed in pale grayish-silver pubescence, longer silverish setae interspersed on dorsal surfaces. Cheliceral width 2.7 mm. Cheliceral width/carapace width, 0.53. Promargins of each fang furrow with eight macroteeth.

Carapace clothed with medium long dense black hairs (Munsell, 5Y 2/1), not closely appressed. Thoracic groove a transverse pit. Cephalic region not rising abruptly from thoracic region, but in gradual arch. Extreme posteriodorsal surface with scattered medium length bristles, shorter bristles just anteriad.

Ocular area compact and elevated, turret comparatively low. Anterior eye row slightly procurved; AME round, diameter 0.3 mm, separated from each other by their diameter; ALE oval, length 0.8× AME diameter; AME-ALE 0.1× AME diameter. Posterior eye row nearly straight, at most slightly procurved; PME rounded, 0.7× AME diameter, separated from each other by



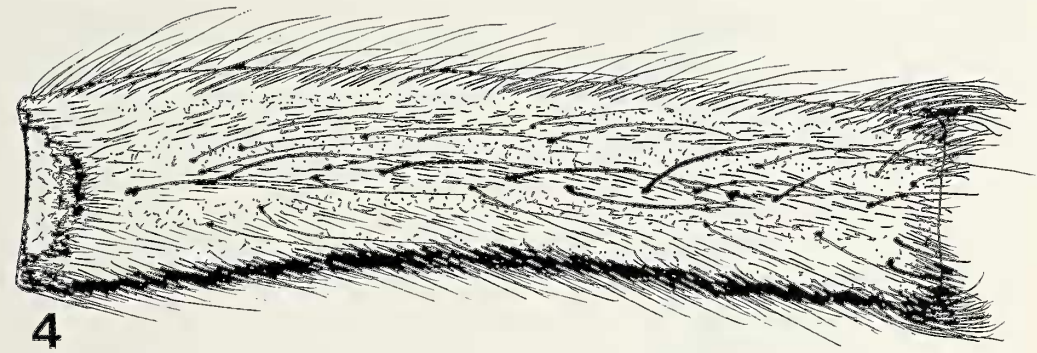


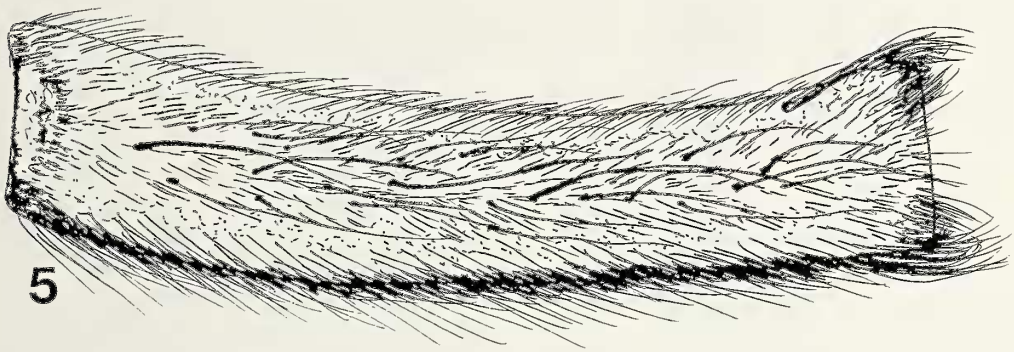


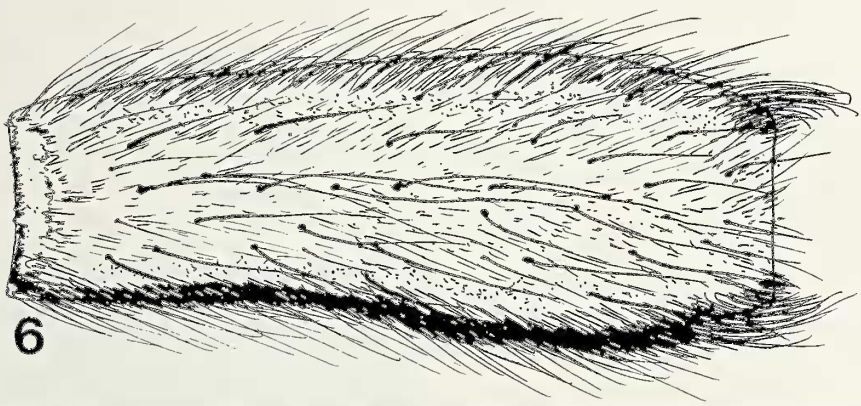
Figures 1–3.—*A. paloma*, new species. Scanning electron micrographs showing setae (arrows) dividing scopula on right tarsi, ventral: 1, paratype male, tarsus III (top), tarsus IV (bottom), ×24; 2, center section of tarsus IV in Fig. 1, ×200; 3, paratype female, tarsus III (top), tarsus IV (bottom), ×36.

1.5× AME diameter; PLE rounded, 0.7× AME diameter; PME-PLE nearly contiguous; ALE-PLE 0.4× AME diameter; AME-PME 0.1× AME diameter; median ocular quadrangle wider posteriorly.

Abdomen with short black (Munsell, N 1/)







Figures 4–6.—*Aphonopelma paloma*, new species. Right femora of holotype male showing relative widths, dorsal: 4, femur IV; 5, femur I; 6, femur III.

pubescence, long dark brown setae with straw-colored apices (Munsell, 5 YR 7/10, 10 YR 8/6) and longer attenuated setae, bases dark brown, distal halves straw-colored (Munsell, 10 YR 8/6) copiously interspersed. Longest setae less dense on venter than dorsum. Circular patch of black type I (Cooke et al. 1972) urticating hairs (Fig. 8) covering posteriodorsal ⅔ of abdomen.

Legs black and hirsute; black pubescence in addition to medium long dark brown to black setae with straw-colored apices, medium density, and very long straw-colored setae with dark brown bases, low density. All tarsi fully scopulate with setae dividing tarsus IV scopula on proximal 0.60. Extent of metatarsal scopula: metatarsus I, 0.67; metatarsus II, 0.50; metatarsus III,

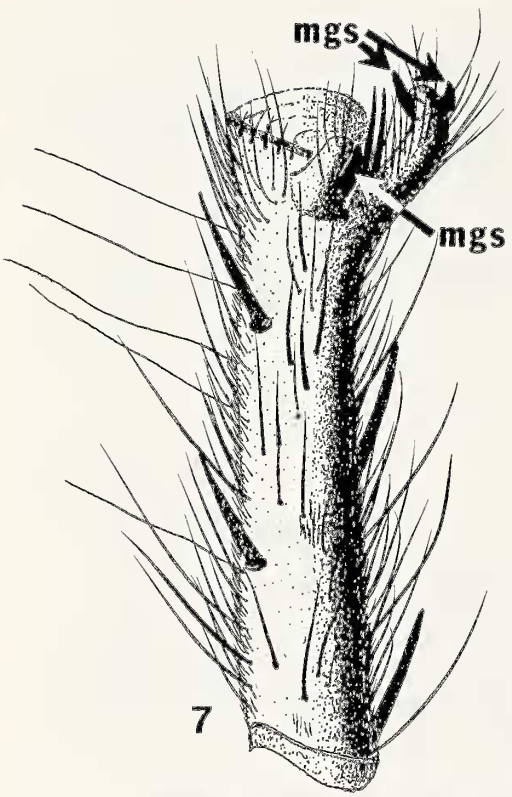


Figure 7.—*Aphonopelma paloma*, new species. Left tibia I of holotype male showing general shape of spur processes and megaspine location, prolateral aspect; mgs = megaspine.

distal 0.25 divided by setae; metatarsus IV, distal 0.17, divided by setae.

Spination: leg I, metatarsus 1d(p0.33) 2v(1ap 1am), tibia 2d(1p0.33 1p0.67) L4v(1rb 1r0.50 2re) R5v(1rb 2r0.50 2re), femur 1d(pe); leg II, metatarsus 1d(p0.40) 4v(1ap 1am 1ar 1r0.50), tibia 2d(1p0.33 1p0.67) L4v(1pe 1re 1r0.50 1rb) R5v(1pe 1re 1r0.50 2rb), femur 1d(pe); leg III, metatarsus 4d(1pe 1re 1p0.60 1r0.60) R5v(1ap 2ar 1m0.50 1p0.50) L7v(1ap 1am 2ar 2p0.50 1r0.50), tibia 4d(1p0.33 1r0.33 1p0.75 1r0.75) R4v(2pe 1p0.50 1m0.50) L5v(2pe 1re 1p0.50 1m0.50); leg IV, metatarsus 4d(1pe 1re 1p0.50 1r0.50) 9v(5a 2r0.40-0.75 1p0.50 1m0.50), tibia R3d(1p0.25 1r0.25 1r0.75) L3d(1p0.25 1r0.25 1p0.75); palp, tibia 2v(1p0.50 1r0.50), femur 1d(pe).

Sternum widest between bases of second and third coxae, sigilla at margins of sternum opposite coxae I, II and III, posterior sigillum largest. 37 cuspules on proximoventral surface of right maxilla, 39 on left. 40 labial cuspules.

Table 1.—*Aphonopelma paloma*, holotype male: leg and pedipalp length (mm).

Leg	I	II	III	IV	Palp
Coxa	2.3	2.0	1.8	1.9	1.9
Trochanter	1.3	1.2	1.0	1.1	1.2
Femur	6.1	5.5	5.0	5.8	3.6
Patella	2.7	2.4	2.1	2.4	1.8
Tibia	4.8	4.0	3.4	4.7	3.4
Metatarsus	4.4	4.4	4.7	6.0	
Tarsus	2.7	2.7	2.7	3.0	1.0
Total leg length	24.3	22.2	20.7	24.9	12.9

Female: Allotype female. Length 16.2 mm. Carapace length 5.2 mm, carapace width 4.2 mm, carapace width/carapace length 0.81. Tibia I/metatarsus I, 1.17. Leg span 33 mm. Female gray; legs and carapace bronze-gray (Munsell, 10 YR 4/2) and abdomen black-gray (Munsell, 10 YR 3/1). Ventral aspect also gray except orange-brown color of labium and anterior halves of maxillae. Third femur not swollen as in male. Leg and palp segment lengths in Table 2.

Chelicerae clothed in grayish pubescence with long silverish setae as in holotype; cheliceral width 3.1 mm. Cheliceral width/carapace width, 0.74. Promargin of right fang furrow with eight macroteeth, left fang furrow with seven macroteeth. Carapace clothed in moderately short, dense bronze-gray hairs more closely appressed than in male. Numerous black attenuated setae, apically straw-colored, interspersed. Thoracic groove transverse, slightly procurved. Cephalic region rising abruptly from thoracic region, in profile steeper and higher than in male. Eye arrangement similar to holotype; AME diameter slightly great-

Figure 8.—*Aphonopelma paloma*, new species. Type I urticating hair, Scanning electron micrograph, ×780.

Table 2.—*Aphonopelma paloma*, allotype female: leg and pedipalp length (mm).

Leg	I	II	III	IV	Palp
Coxa	2.0	1.6	1.4	1.7	1.9
Trochanter	1.1	0.9	0.8	1.0	1.1
Femur	3.9	3.4	3.0	4.0	3.0
Patella	2.2	1.9	1.8	2.0	1.6
Tibia	2.8	2.3	1.9	3.1	2.2
Metatarsus	2.4	2.2	2.4	3.6	
Tarsus	1.8	1.6	1.6	2.0	1.9
Total leg length	16.2	13.9	12.9	17.5	11.7

er than 0.2 mm, separated from each other by 0.7× AME diameter; ALE round (appear ovoid when viewed from above), slightly smaller than AME; AME-ALE 0.2× AME diameter; PME round, diameter somewhat greater than 0.1 mm, separated from each other by 1.8× AME diameter; PLE somewhat ovoid, length 0.8× AME diameter; PME-PLE, ALE-PLE, AME-PME as in holotype.

Abdomen clothed in short dark gray pubescence. Color of medium long and longest setae as in holotype. Medium long setae copiously interspersed, longest setae sparse, confined mostly within circular patch of black urticating hairs on posterior ⅔ of abdomen.

Legs covered with bronzish-gray pubescence in addition to short and medium length black-based straw-gray setae. Longest setae as in holotype but less dense. All tarsi fully scopulate, setae dividing tarsus IV proximal 0.88, tarsus III proximal 0.33. Extent of metatarsal scopula: metatarsus I, 0.67; metatarsus II, 0.50; metatarsus III distal 0.33, divided by setae; metatarsus IV, few scattered scopula hairs on distal end.

Spination: Leg I, metatarsus 1v(am), tibia 1v(p0.40), femur 1d(pe); leg II, metatarsus 1d(p0.50) 4v(1ap 1am 1ar 1r0.40), tibia 1d(p0.50) R1v(r0.50) L(0); leg III, metatarsus 4d(1pe 1re 1p0.50 1r0.50) R6v(1ap 1am 2ar 1p0.50 1r0.67) L7v(2ap 1am 2ar 1p0.67 1m0.67), tibia 2d(1p0.50 1r0.50) R3v(1pe 1p0.60 1m0.60) L2v(1pe 1p0.60); leg IV, metatarsus 4d(1pe 1re 1p0.50 1r0.50) R6v(1ap 1am 1ar 1p0.50 1m0.75 1r0.50) L8v(1ap 1am 2ar 1p0.67 1p0.88 1m0.67 1r0.88); palp, tibia 3v(2pe 1re), femur 1d (pe).

Widest point of sternum and position of sigilla as in holotype. 43 maxillary cuspules on proximoventral surface of right maxilla, 48 on left. 36 labial cuspules.

Variation.—No evidence has been found to correlate intraspecific variation with the geographical distribution of *A. paloma*. Allometric and other morphometric variations most likely reflect phenotypic plasticity. However, because of their possible value in species designation, specific variational ranges and ratios are included in this section.

Males: 10 (nine with leg measurements including holotype). Overall length 9.9–14.1 mm. Carapace length 4.2–6.2 mm, width 3.6–5.5 mm. Carapace width/carapace length 0.85–0.95, mean 0.89. Cheliceral width/carapace width 0.49–0.59, mean 0.54. Eight cheliceral macroteeth most common (7, 7 in one individual, 9, 8 in another, and 7, 8 in a third). Tibia I, in all specimens, longer than metatarsus I; tibia I/metatarsus I, 1.04–1.11, mean, 1.08. Metatarsus IV/carapace length >1 as in holotype. Leg and palp segment length ranges are in Table 3. Femur III 1.36–1.58× width of femora I and IV. Femur I equal to or slightly longer than femur IV. Variation in leg and palpal spination is recorded in Table 4 showing approximate position and percent occurrence of each spine. Relatively little variation was found in the palpal bulb. Interspecific differences in bulb morphology have proven to be of some value in distinguishing theraphosid spe-

Table 3.—*Aphonopelma paloma*, 9 males, holotype: range of leg and pedipalp segment lengths (mm). For example, smallest specimen = 1.7 mm, largest specimen = 2.4 mm.

Leg	I	II	III	IV	Palp
Coxa	1.7–2.4	1.5–2.1	1.3–1.9	1.4–2.2	1.4–2.1
Trochanter	0.9–1.3	0.8–1.2	0.8–1.1	0.8–1.3	0.9–1.4
Femur	4.4–6.3	4.0–5.8	3.6–5.2	4.4–6.1	2.7–3.7
Patella	2.0–2.7	1.7–2.4	1.6–2.3	1.7–2.4	1.4–1.9
Tibia	3.5–4.8	2.9–4.2	2.5–3.5	3.6–5.0	2.6–3.3
Metatarsus	3.2–4.6	3.1–4.6	3.3–5.0	4.4–6.5	
Tarsus	1.8–2.7	1.9–2.7	1.9–2.7	2.2–3.2	1.0–1.2

Table 4.—*Aphonopelma paloma,* male (9 males, holotype) spination. Approximate position and percent occurrence of each leg and palpal spine. Spination abbreviations are defined in the Methods section of text. Dorsal (d) refers to upper half, ventral (v) to lower half of segment. An asterisk (*) indicates present on at least one of segment pair in all specimens; two asterisks (**) indicate present on at least one of segment pair except in the smallest specimen.

	100–80%	79–60%	<60%
d-Me-I		1-p1/3-1/2(69)	
v-Me-I	1-am(100)		1-ap(44) 1-ar(6) 1-p1/4-1/2(15)
d-Ti-I	1-p2/3(100) 1-p1/3(89)**		
v-Ti-I	1-er(100) 1-1/2(m or p)(100)	2nd-er(67) at least on 1 of leg pr.	2nd-er(56) 1-b(p or m)(56) 2nd-v p1/2(11) 2nd-bp(22) 3rd-b(p or m)(11)
d-Fe-I	1-ep(100)		
d-Me-II	1-p1/2(83)**		
v-Me-II	3-a(1p 1m 1r)(94)* 1-1/2(r or m)(100)		4th-a(22) 1-additional(17)
d-Ti-II	1-p2/3(94)* 1-p1/3(83)*		1-ep(11)
v-Ti-II	2-e(1p 1r)(94)* 1-r2/5-2/3(100)		2nd-ep(17) 2nd-er(6) 1-em(11) 1-br(5) 1-m1/2(28) 1-var.(38)
d-Fe-II		1-ep(61)	
d-Me-III	2-e(1p 1r)(100) 2-1/2(1p 1r)(83)*		
v-Me-III	4-a(1p 1m 2r)(89)* 2-1/2(1p 1m or r)(94)*		5th-a(25) 3rd-v(17)
d-Ti-III		2-2/3(1p 1r usu.)(78)**	1-p1/3(56) 1-r1/3(33)
v-Ti-III	1-ep(94)*	1-er(67)** 1-p1/2(78) 1-1/2(r or m)(72)	2nd-ep(28)
d-Me-IV	2-e(1p 1r)(83)** 1-r1/2(83)*	1-p1/2(72)	
v-Me-IV	4-a(1p 1m 2r)(100) 3-v(1p 1r usu.)(100)	5th-a(r)(78) 4th-v(78)**	6th-a(11) 7th-a(11) 5th-v(33)
d-Ti-IV	1-r2/3(89)*		1-r3/5(33) 1-p1/3(33) 1-ep(11) 1-p3/5(6)
v-Ti-IV	1-ep(100)	1-p1/2(27) 2nd-1/2m usu.(61)	1-er(50) 2nd-ep(44)
d-Ti-Palp			1-p3/5(33) 1-ep(17)
v-Ti-Palp		1-p1/2(61)	1-r1/2(40) 1-var.(11)
d-Pt-Palp			1-p(11)
d-Fe-Palp			1-ep(56)

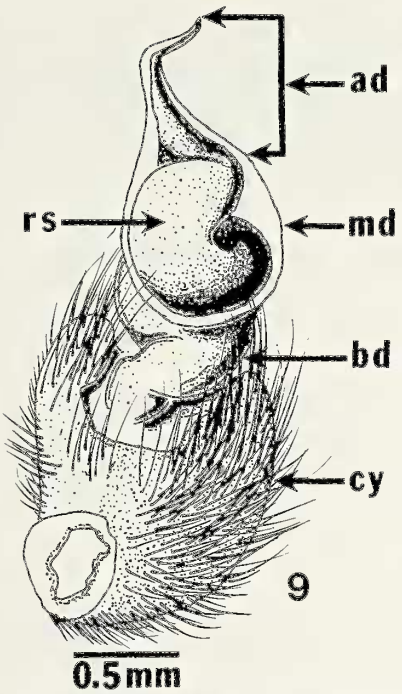


Figure 9.—*Aphonopelma paloma*, new species. Left palpal tarsus of paratype male showing cymbium, bulb, and convolution of the receptaculum seminus, ventral aspect. ad = apical division of bulb; bd = basal division; cy = cymbium; md = middle division; rs = receptaculum seminus.

cies. Apical and middle divisions of *A. paloma* bulb subequal, basal ⅔ of apical division tapering rapidly, distal third uniformly narrow (Fig. 9). Extent of scopula: metatarsus I, 0.50–0.88; metatarsal II, 0.40–0.60; metatarsus III, 0.20–0.40; metatarsus IV, 0.20 to few scattered hairs. Tarsus IV scopula divided by stout setae often forming a band, proximal 0.50 to entire; tarsus III scopula divided by weaker setae, proximal 0.0–0.88; metatarsus III and IV divided by setae, metatarsus III sometimes by scattered setae. 30–60 maxillary cuspules per maxilla, 28–57 labial cuspules.

Females: 11 (including allotype). Overall length ranging from 12.2–19.0 mm averaging 15.0 mm. Little color variation in newly molted females. Faded individuals lighter gray-brown or gray-bronze. Carapace length ranging 4.3–6.1 mm, width 3.6–5.0 mm, carapace width/carapace length 0.81–0.84, mean 0.82. Carapace width greater than length of femur I and IV. Cheliceral width/carapace width 0.67–0.76, mean 0.70. Eight cheliceral macroteeth most common (9, 8 in one individual, 8, 7 in another, 10, 9 in a third). Tibia I, as in males, longer than metatarsus I; tibia I/metatarsus I 1.19–1.29, mean 1.22. Metatarsus IV shorter than both carapace length and width. Leg and pedipalp segment length ranges are in Table 5. Femur III not swollen as in male. Femur I equal to or shorter than femur IV. Variation in leg and palp spination is recorded in Table 6 showing approximate position and percent occurrence of each spine. Only two forms of seminal receptacle shape have been found (Fig. 10, 11), both in paratypes. The sclerotized nature of each form suggests that variation may result from phenotypic plasticity. Extent of metatarsal scopula: metatarsus I, 0.67–full; metatarsus II, 0.50–0.60; metatarsus III, 0.25–0.40; metatarsus IV, 0–0.17. Tarsus IV scopula divided by stout setae often forming a setal band, tarsus III proximal 0.40–0.67 divided by weaker setae except undivided in one specimen. Metatarsus III and IV divided by setae. 38–70 maxillary cuspules per maxilla, 35–55 labial cuspules.

Distribution.—Habitable terrain is in the SW Arizona desert from 680–1950 ft. elevation, on relatively flat and sandy bajadas and plains conducive to burrowing. Major vegetation types include creosote bush, saguaro cactus, ocotillo,

Table 5.—*Aphonopelma paloma*, 10 females, allotype: range of leg and pedipalp segment lengths (mm). For example, smallest specimen—1.6 mm, largest specimen—2.3 mm.

Leg	I	II	III	IV	Palp
Coxa	1.6–2.3	1.4–2.0	1.2–1.8	1.4–2.0	1.6–2.2
Trochanter	0.9–1.2	0.8–1.0	0.7–0.9	0.8–1.1	0.9–1.1
Femur	3.1–4.6	2.7–4.0	2.5–3.6	3.3–4.8	2.5–3.6
Patella	1.8–2.5	1.5–2.3	1.4–2.0	1.7–2.3	1.4–1.9
Tibia	2.3–3.4	1.9–2.7	1.5–2.3	2.4–3.5	1.7–2.5
Metatarsus	1.9–2.8	1.8–2.7	1.9–3.0	2.8–4.2	
Tarsus	1.3–2.2	1.3–2.1	1.3–2.1	1.7–2.4	1.6–2.3

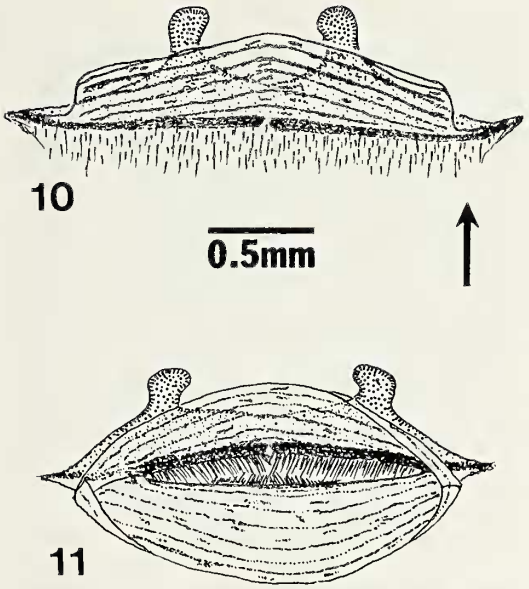
Table 6.—*Aphonopelma paloma,* female (10 females, allotype) spination. Approximate position and percent occurrence of each leg and palpal spine. Spination abbreviations are defined in the Methods section of text. Dorsal (d) refers to upper half, ventral (v) to lower half of segment. An asterisk (*) indicates present on at least one of segment pair in all specimens; two asterisks (**) indicate present on at least one of segment pair except in one specimen.

	100–80%	79–60%	<60%
v-Me-I	1-am(100)		1-ap(59)
			1-b1/3(5)
d-Ti-I			1-bp1/4(5)
v-Ti-I			1-1/2(r or m)(27)
			1-er(18)
d-Fe-I			1-ep(18)
d-Me-II			1-p1/2(36)
v-Me-II	3-a(1p 1m 1r)(86)*		2nd-v1/3-1/2(14)
	1-r1/3-1/2(86)*		
d-Ti-II			1-p1/2(45)
v-Ti-II			1-r1/2(59)
d-Me-III	2-e(1p 1r)(100)		
	2-1/2(1p 1r)(95)*		
v-Me-III	4-a(1p 1m 2r)(95)*		5th-a(p)(5)
	2-1/2(1p 1r or m)(86)*		
d-Ti-III	1-r2/5-3/5(86)*		1-p2/5-3/5(45)
			1-r3/4-7/8(5)
v-Ti-III	1-ep(82)		2nd-ep(14)
			1-1/2(45)
			2nd-1/2(14)
d-Me-IV	2-e(1p 1r)(82)		
	1-r1/2(86)**		1-p1/2(55)
v-Me-IV	4-a(1p 1m 2r)(95)*	3rd-v(var.)(68)	5th-a(36)
	2-1/2(1p 1r or m)(95)*		6th-a(5)
			4th-v(var.)(27)
d-Ti-IV	1-r1/2-7/8(82)**		1-r2/5(27)
v-Ti-IV		1-ep(73)	2nd-e(p usu.)(32)
			1-1/2(45)
			4th-v(var.)(5)
d-Ti-Palp			1-p(14)
v-Ti-Palp	3-e(1r 2p usu.)(95)*		1-r1/2(36)
			1-p1/2(18)
d-Fe-Palp		1-ep(73)	

cholla (Pinal and Pima Co.), acacia, palo verde, and bur sage (*Ambrosia*).

Natural history.—***A. paloma*** appears to have a very limited activity cycle. Open burrows have been observed only between the last week of October and mid-December. After unplugging burrow entrances the small tarantulas deposit silk-bound earth and accumulated debris from burrows either adjacent to or removed from the entrances by up to 15 cm. The resulting crescent-shaped mounds are typical of the species and have not been observed in other U.S. theraphosid species (Fig. 12). The maximum open burrow density corresponds to the height of the breeding season in mid-November. After the first heavy winter rains, often in December, the crescent mounds are flattened and burrows cannot be found.

Entrance hole diameters for mature females range from 5–10 mm. Smaller diameter burrows have been excavated and contained immature individuals. Burrow mouths are often lined with a thin layer of silk extending for up to a few mm onto and below the ground surface in contrast to most U.S. theraphosids which generally have a thicker layer extending several mm in either direction. Burrow depths range from 30–62 cm, but most often are about 50–54 cm, with very few less than 46 cm. Burrows are primarily vertical with little horizontal deviation. Toward the



Figures 10, 11.—*Aphonopelma paloma*, new species. Spermathecae of two paratype females illustrating two forms found; 10, bulbs separated by ~ 0.5 mm, egg canal closed; 11, bulbs separated by ~ 0.75 mm, egg canal open. Anterior direction indicated by arrow.

bottom they widen into horizontal or oblique terminal chambers. One or two additional side chambers are often found along the burrow, generally at junctions where it makes a brief horizontal run or otherwise changes direction.

Most activity is nocturnal. Mature females and immatures can be observed in the evening hours either carrying excavated materials with their chelicerae and pedipalps or waiting near or just inside their burrows for passing prey. Females have not been observed more than 20 cm from the burrows. Prey consists of beetles (many in the Tenebrionidae), harvester ants (Myrmicinae), and arachnids, including other spiders and small scorpions. Remains of these have been found in excavated mounds and in the terminal chambers.

In the late fall breeding season, males can be found wandering by day in search of female burrows, especially from late morning until early afternoon. No active males have been found after dark. Mating is diurnal and occurs outside the burrow. Courtship and mating behavior in *A. paloma* is typical of the genus (pers. obs.). Upon finding a female burrow, the male generally taps the ground near the burrow entrance with his first pair of legs, often quite forcefully. Gentle substratum drumming with the palps commonly accompanies leg tapping, but the two behaviors are not simultaneous. The spider sporadically alternates leg tapping and palp drumming with a stridulating vibration in which his body moves in a rhythmic up and down fashion with femur III positioned almost vertically (stridulation mechanism has not been isolated). Each stridu-

Figure 12.—*Aphonopelma paloma*, new species. Photograph of burrow entrance showing typical crescent-shaped excavation mound.

lating pulse is of short duration, often less than three s. The stridulating posture is also seen at various intervals during the course of the male's wandering. In two large U.S. theraphosid species (*A. reversum* Chamberlin and *A. eutylenum* Chamberlin), vibrations from male stridulation can be detected by the females from at least 1.2 m through a combination of 12 cm earth, 16 mm Plexiglass, and approximately 2.4 m tubular stainless steel (pers. obs.). Females of these species responded by rapidly drumming their first two pairs of legs. This drumming behavior is also seen in *A. paloma* females in response to male stridulation. These behaviors suggest long distance communication between male and female tarantulas. The male continues courtship behavior until the female emerges from the burrow and contact is made. After mating both spiders usually run (female often walks) in opposite directions, the female back into her burrow, the male several cm away.

It is not known when the female constructs her cocoon and deposits eggs. Tarantulas of many other U.S. species lay eggs in spring or early summer (Baerg 1958; Gertsch 1979). Most *A. paloma* spiderlings have dispersed by September, and none can be found with females when burrows are unplugged in October or November. Four burrows excavated between 1–3 September 1991 contained young. Of the two burrows at the Pinal Co. site, one contained a female with five young, one of which had the shortest carapace length, 1.5 mm, the other contained one juvenile (no female present), had the longest carapace length, 2.1 mm, and was the largest (length 6.1) of all young found. Of the two remaining burrows at Sentinel (Maricopa Co.) site 1 contained a female with three young, the other contained one young (no female present). All young appeared to be in their second or third instar. I assume that more than five young emerge from most egg sacs since dissected females have been found with approximately 40–100 developing eggs but evidence of when and how young dispersed has not been found. Populations of these tarantulas are often subdivided into loose aggregations where burrow densities have been observed as high as 14 per 10.7 m^2.

One species of pompilid wasp was reared from a parasitized *A. paloma* female (Sentinel, Maricopa Co. site) and was identified as *Hemipepsis ustulata ustulata* Dahlbom. No other predators are known.

DISCUSSION

This study found size, general reduction of metatarsal scopula, division of tarsal scopula by setae, and swollen third femora of males to be reliable characters in distinguishing *A. paloma* from other recognized North American *Aphonopelma*. Overlap in size between valid *Aphonopelma* species and *A. paloma* has not been seen. However, Jung (1975) described a small species within which overlap with the largest *A. paloma* males occurred. Metatarsal scopula in *A. paloma* is more reduced than in the other species. Division of tarsal scopula by setae (either partially or wholly), in itself, separates this new species from all other *Aphonopelma* (Chamberlin 1940; Raven 1985). The swollen third femur of the male is also unique in this genus.

Based on the work presented here, it appears that many of the characters used by Chamberlin to distinguish theraphosid species may be highly variable within a species. Nine of the 24 couplets in his male *Aphonopelma* key are based on relative number and position of leg and palpal spines. For example, *Delopelma* and *Gosipelma* subgenera were differentiated on the basis of two and four submedian spines, respectively, on the prolateral face of the palpal tibia. I have found that *A. paloma* type males (also with tibia I longer than metatarsus I) have 0, 1, or 2 submedial prolateral spines. Furthermore, *Delopelma* was divided into two sets of species by the number of ventral spine levels between the base and spur of tibia I, two species with 1 or 2 spine levels on tibia I and 1–2 ventral spines on the palpal tibia, and two species with 4 or 5 spine levels on tibia I and no ventral spines on the palpal tibia. *A. paloma* males have 1, 2, or 3 levels of spines on tibia I and 0, 1, or 2 ventral spines on the palpal tibia. Similarly, males of an undescribed California species (all specimens from a single location) have 2–4 submedial prolateral spines, 1–4 ventral spines on the palpal tibia, and 2–4 levels of ventral spines on tibia I. All of these examples suggest that spination is more variable within species than previously thought. Reliable spination patterns may emerge as additional variational data accumulate for each species.

Chamberlin used relative lengths of tibia and metatarsus I to differentiate *Aphonopelma* from *Gosipelma* and *Delopelma* species. Although this character appears to be valuable in distinguishing between some morphologically similar allopathic species or between sympatric species within

geographical isolates, ratio reversals of tibia I/metatarrsus I may represent opposite ends of morphoclines within extensive continuous populations.

Raven (1985) maintained that *Dugesiella* shares with *Rhechostica* = *Aphonopelma* (ICZN, Opinion 1637) the thornlike setae on the prolateral coxae and that no other known characters merited its continued separation from *Aphonopelma*. Jung (1975) did not feel that prolateral coxa I setation warranted generic or subgeneric designation because he found a gradual reduction of swollen setal bases from *Dugesiella* to *Chaunopelma*. He found that generic designations of North American tarantulas were based on characters that are shared in different degrees by all the genera. In spite of the uniqueness of *A. paloma*, there is little use in considering it or any other North American theraphosid as other than *Aphonopelma* until variational ranges have been determined for all proposed species. Only by examining sufficient numbers of each of these species will their variational ranges become comparable and the taxonomic significances of these various characters be realized.

Material examined.—The type specimens and the following: **USA: Arizona**; Maricopa Co., 2 mi. N. Sentinel, 690 ft. elev., 18 November 1989, 1 female, 4 Jan. 1990, 1 female, 26 Oct. 1990, 2 males, 2 females, 10 Nov. 1990, 1 female; Rd. 355, 1 mi. S. Granite Reef Aqueduct, 1400 ft. elev., 10 Nov. 1990, 1 female, 11 Dec. 1990, 1 female; Pima Co., 3 miles E. Ajo, 1780 ft. elev., 18 Nov. 1989, 1 male; 0.1 mile N. boundary Organ Pipe Cactus National Monument, 1950 ft. elev., 18 Nov. 1989, 1 male; 15 miles. S. Ajo, 1650 ft. elev., 30 March 1990, 1 female.

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